The AoA

An Early Filter to Create an Affordable Program

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A n analysis of alternatives (AoA) has long been required for major defense acquisition programs (MDAPs) and major automated information system (MAIS) programs as a matter of DoD policy (DoDI 5000.02) and has recently become a requirement, as a result of the 2366 certification process and the Weapon Systems Acquisition Reform Act (WSARA) of 2009. While DoD has a long history of conducting AoAs prior to initiating major programs, the new statutory guidance on AoAs has increased AoAs' importance and emphasis. This is consistent with an intentional, concerted transition in the Department's acquisition culture to devoting more attention and planning to major programs earlier in the

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process (i.e., prior to milestone B). The statutory references to AoAs are brief and could be construed as inconsequential—merely codifying what had previously been required under DoD policy. However, the effects of the statutory guidance on AoAs have been more significant than a simple reading of the law might indicate.

Why Do an AoA?

One answer is obvious: It is required for ACAT 1A and 1AM programs. However, the more salient reason, not only for MDAPs and MAIS programs, but also for smaller programs, is that an AoA positions the Department to pursue the most effective course to obtaining the capability. An AoA is simply a structured, unbiased framework for evaluating the most promising alternatives for a given need, comparing the merits and risks of each, and providing a recommended approach to decision makers. Clearly, it makes sense for large programs to devote considerable time and effort to an AoA prior to investing significant resources in a specific approach. But ideally, AoAs should be done for any DoD effort that has multiple alternatives, just as individuals perform an alternatives analysis when facing a major personal decision. Whether we realize it or not, most of us probably do a mini-AoA, at least in our minds, for personal decisions like selecting a university, choosing between job offers, or whether to buy a new or used car. Just as we shouldn't pull the trigger on a personal decision based on the advice of one vendor, the Department shouldn't engage in expensive technology development without considering various alternatives in a systematic fashion. Thought about this way, an AoA is a prerequisite to initiating a sound acquisition program.

Recent Statutory Guidance

For MAIS programs, the statutory guidance to conduct an AoA prior to program initiation is contained in Section 811 of the 2001 National Defense Authorization Act (NDAA). Subtitle III of title 40 of U.S. Code (also known as the Clinger-Cohen Act of 1996) also addresses the requirement to conduct an AoA and economic analysis for all information technology investments. For MDAPs, Section 2366b of title 10, U.S. Code, added by the NDAA of 2006, requires that the Milestone Decision Authority (MDA) certify to Congress that DoD has conducted an AoA prior to milestone B approval; in 2009, WSARA added a similar provision to Section 2366a of title 10 that requires an AoA be conducted prior to milestone A. WSARA also specifically directed that the director of Cost Assessment and Program Evaluation (DCAPE) "take the lead

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in the development of study guidance for an analysis of alternatives for each joint military requirement for which the chairman of the JROC is the validation authority." However, in addition to assigning responsibility for study guidance, WSARA further stipulated that the DCAPE "shall serve as the principal official within the senior management of DoD for the … performance of such analyses." These few sentences in WSARA have had a significant impact on how AoAs are conducted in the Department.

CAPE's Expanded Role

Prior to WSARA, the director of program analysis & evaluation (PA&E), CAPE's predecessor organization, also was responsible for drafting study guidance for AoAs and for conducting sufficiency reviews documenting how well the AoA met that guidance. However, the guidance and review prepared by PA&E were provided to the USD(AT&L) as internal DoD documents; the director of PA&E did not have the authority or responsibility to reject an AoA or direct that it be redone. To be sure, the D, PA&E's advisory powers were significant; however, he was not the decision authority for AoAs. The elevation of the DCAPE to a Senate-confirmed position changed the dynamic by giving the DCAPE responsibility not just for formulating the study guidance, but also for the performance of the analysis. This responsibility no longer is just advisory, since the DCAPE can be called to testify before Congress on any matter within her portfolio. It naturally follows that CAPE senior officials and analysts now have a more active role throughout the AoA execution process, rather than just during formulation of the study guidance and again at the end of the process during the sufficiency review stage.

Prior to WSARA, there was no statutory guidance dictating how an AoA should be conducted or the *minimal content* it must contain. WSARA specifies that the DCAPE must ensure that the AoA study guidance requires both

- "Full consideration of possible trade-offs among cost, schedule, and performance objectives for each alternative considered" and
- "An assessment of whether or not the joint military requirement can be met in a manner that is consistent with the cost and schedule objectives recommended by the Joint Requirements Oversight Council."

Thus, at a minimum, CAPE is charged with assessing how well the AoA conducts tradeoffs between alternatives and whether those alternatives can be realized in accordance with cost and schedule objectives. Proper consideration of trad-

eoffs includes ensuring at least two things: (1) that a range of sufficiently different alternatives are examined and (2) that the alternatives themselves have been adequately evaluated. What determines whether an alternative has been adequately evaluated? No simple answer suffices for all situations, but a real example may be useful. If AoA results indicate that a subsystem specification—say gun caliber or engine power—is key to mission performance, the analysis would be less than adequate if only one of the alternatives considered included that minimal subsystem specification.

Consider Cost and Affordability Upfront

One outcome of greater emphasis on upfront planning has been an enhanced expectation that cost and affordability of potential DoD systems are considered earlier in the process, including much more intensively during requirements generation and at early major milestones, such as materiel development decision and milestone A. This is particularly evident in the Better Buying Power (BBP) Initiatives championed by Deputy Secretary Ashton Carter and Acting Under Secretary Frank Kendall, in which the first of the five Thrust Areas concern "Targeting Affordability and Controlling Cost Growth." In fact, the first initiative, "Mandating Affordability as a Requirement," stipulates that an affordability target be established at milestone A and not changed without the MDA's concurrence. This is a major change from the way the Department operated only a few years ago.

As a cost analyst in the OSD/CAIG in the mid-2000s, one of the authors (Husband) saw the shift in emphasis by DoD senior leaders to attaining earlier information about programs, including the desire for an independent cost estimate (ICE) at milestone A. This was seldom done at the time but became statutory with WSARA in 2009. I remember thinking it wasn't going to pay off; it seemed to me that senior leaders didn't have enough time to review MDAPs at milestones B and C, so how were they going to spend time on programs at milestone A and earlier? I was also skeptical about the value of the information available at the early stages. A cost estimate at milestone A is much more uncertain and challenging than one done at milestone B or C, because of the ill-defined nature of the program at such an early stage and the number of different solutions that must be costed. However, I believe DoD's culture has indeed shifted in recent years as a result of senior leadership's increased emphasis on upfront planning, and I also believe I was wrong about the lack of payoff. Three examples of senior leader engagement at milestone A or earlier are cited in Deputy Secretary Carter's Sept. 14, 2010 guidance memo (Ohio-class submarine, presidential helicopter, and ground combat vehicle). This senior-leader involvement has had a significant impact, resulting in more-affordable, less-risky acquisition strategies, based on more mature technologies, than originally envisioned.

Other examples of early scrutiny of affordability include portfolio reviews, such as those for conventional weapons, ground vehicles, unmanned aircraft, and ground-moving target indicator development. Such reviews are challenging because they require that better, higher-fidelity information be provided earlier—not just from cost estimators, but from all disciplines. However, if such reviews lead to a better understanding of the costs associated with capabilities identified in our requirements documents, the Department will benefit from the time spent producing better information earlier in the process.

This enhanced emphasis on affordability is also evidenced in discussions that occur in Functional Capability Board and Joint Capability Board meetings prior to Joint Requirements Oversight Council reviews. Senior leaders now expect the Services to be able to articulate how and why their recommended alternative is affordable, especially when the recommended option has a higher life cycle cost than lower-performing alternatives. It is no longer satisfactory to assert that a system is affordable simply because the Service is willing to fully fund it; decisionmakers want to see and understand the analysis comparing the effectiveness and costs of the alternatives before they approve a given approach. This is the primary purpose of an AoA—to fully evaluate and fairly compare the effectiveness and cost of all the viable alternatives.

Prior to WSARA, a criticism often heard about the DoD's AoA process was that the Service had already selected its preferred alternative prior to the AoA and, as a result, the AoA was just a rubber-stamp document to "fill-the-square" and move forward with the acquisition process. A corollary criticism was that the AoA was often "outsourced"—i.e., conducted by an organization outside the Service, and as a result, the Service wasn't involved enough in the execution of the AoA. So, a measure of improvement for AoAs conducted under the new, WSARA-mandated process is how well they compare the effectiveness and affordability of the options. AoAs that do that and that also effectively defend the case for the recommended alternative will be valued by DoD decisionmakers and, most importantly, will provide a strong foundation for a successful acquisition program.

Improving Interaction During AoA Execution

Since WSARA passed in 2009, only a few AoAs have been through the complete process, from promulgation of study guidance to AoA out-brief. There is no DoD regulation or instruction that guides the AoA process. As a result, the Services have latitude in how they execute an AoA, as long as they accomplish the objectives in the study guidance. However, a few best practices naturally arise. To ensure good interaction and communication between the Service and OSD stakeholders, an SES-level study advisory group (SAG) is established to monitor results during AoA execution. This group is chaired by CAPE and includes AT&L, Joint staff, and Service representatives. Correspondingly, the Service may establish a Service Executive Steering Board (SESB), an SES-level body that includes Service stakeholders from the requirements, acquisition, and resource communities.

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The purpose of both the SESB and SAG is to ensure that senior leaders are familiar with emerging AoA results and can guide or redirect the effort as necessary, rather than being surprised by results at the conclusion of the AoA. Establishing a SESB also demonstrates that the Service is invested in the process, as opposed to "outsourcing" the AoA or assigning it solely to a Service analytical organization. The SAG and SESB most likely will be linked through common participants, which improves communication throughout the process and lowers the likelihood that surprising results or unexpected objections will be encountered. These groups also help facilitate another best practice—that of "transparent analysis."

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Prior to WSARA, after the AoA study guidance was released to the Service, there was often little or no interaction with PA&E or AT&L until the AoA report and briefing had been completed and fully coordinated through the Service. In an actual extreme case, a Component performing an AoA provided no updates during execution and provided the read-ahead literally on the morning of the briefing to PA&E leadership. Now, to be successful, more interaction with CAPE and AT&L during AoA execution is desired and expected. That doesn't mean that OSD personnel should direct the study or have significant influence on AoA execution decisions—there may be times when Service-only meetings are necessary. But keeping OSD analysts informed and involved to the extent they are comfortable will pay dividends in the long run, as it enables them to inform their leadership, so there are no big surprises when the AoA results are reported and reviewed.

AoA: Where Requirements, Acquisition and Resourcing Communities Come Together

As much as analysis has been mentioned, one might suppose that AoAs are prepared solely by analysts. In fact, that should not be the case. A wide-range of organizations should be represented on the study team executing an AoA, not only from the requirements, acquisition, and resourcing disciplines, but also from functional areas such as intelligence, logistics, technologists, testers, operators, etc. One should also consider involving contractors and non-DoD organizations; contractor input (properly safeguarded) can be useful in defining the feasibility of various alternatives, while non-DoD organizations sometimes have key information or a shared set of requirements that impact DoD programs. Deficiencies in past AoAs have sometimes resulted from lack of interaction between the requirements developers (or users) and the acquisition

community that conducted the AoA. If the requirements are just "thrown over the fence" to the acquisition community and there is little interaction during AoA execution, it is difficult to make affordability trades, for instance.

What should an analyst or acquisition professional do about requirements that are deemed unaffordable? Ideally, user input would be solicited to modify, tailor, or prioritize the requirements. But if the user isn't involved, those performing the AoA are likely to make the best judgment they can based on the information available. Similarly, if an AoA is conducted without adequately defined requirements and the user isn't involved, analysts or acquisition personnel are forced to make judgments about requirements and capability gaps that the user should establish. Those conducting the AoA will undoubtedly put their best thought and effort into the problem, but the AoA is likely to suffer from the lack of user involvement. The AoA, more than any other acquisition document, is where the requirements, acquisition, and resourcing communities come together to decide which affordable alternative is best.

AoA: The Foundation of a Successful Acquisition Program

A well-executed AoA doesn't guarantee program success; many more things must be done right to effectively deliver capability. It's clear, however, that a poorly executed AoA makes success more difficult. Analysis that doesn't fully examine the tradespace or that is biased toward one alternative may lead to pursuit of an infeasible or inferior option. At the very least, it establishes a precedent that incomplete or insufficient analysis is acceptable, which is likely to become a pattern as the program proceeds. In the current fiscal environment, in which the DoD has rightly been criticized for spending as much as 40 percent of its acquisition funding on programs that were terminated before delivering capability, it is more important than ever to start a program on a firm foundation with a well-executed AoA.

When deciding where to live for the next 20 years, a prudent individual will consider all the viable alternatives—buying new, buying an existing home, custom building, renting, perhaps even living on a houseboat; the same principle applies to DoD before it invests in a weapon system it will likely use for 20 years or more. &